

CLAIMS

1. (currently amended) A method of distributing a single video conference to at least three member devices via a multicast data group and a multicast session, the method comprising the steps of:

establishing a plurality of virtual channels for the video conference multicast session, each virtual channel simultaneously carrying multiple streams of video conference data of the single video conference, each stream transmitted from a different member device, each virtual channel defined by an amount of time remaining until expiration, at least two of which are different, and being operable to deliver the same video conference to member devices associated with that respective virtual channel;

receiving, at a key distributor device, a request from a requestor device to join the multicast session, the request device indicating a requested start time for joining the video conference and an amount of time of utilization of the multicast session;

selecting a virtual channel from the plurality of virtual channels for communications by the requestor by correlating the start time and the amount of time indicated by the requestor with the amount of time remaining until expiration of the virtual channels at that start time;

forwarding a new key for the selected virtual channel to the requestor;

forwarding the new virtual channel key to all pre-existing members of the selected virtual channel;

~~combining video conference input signals from the requestor device and the other member devices to produce a video conference data signal; and~~

distributing the video conference data signal to the members of the multicast group via each of the virtual channels,

whereby the requestor device joins the video conference multicast data group without prompting re-keying of other member devices of the video conference associated with virtual channels other than the selected virtual channel.

2. (previously presented) A method according to claim 1, wherein each virtual channel of the plurality of virtual channels is associated with a different time duration.

3. (original) A method according to claim 1, wherein no member can be in more than one virtual channel.
4. (original) A method according to claim 1, further comprising:
distributing a data key to each multicast virtual channel.
5. (original) The method according to claim 1, wherein all of the virtual channels reside within one domain.
6. (original) The method according to claim 1, further comprising:
rekeying the virtual channel key when membership of the virtual channel changes.
7. (original) The method according to claim 6, wherein in the act of rekeying at least one member is present in the virtual channel after the membership changes.
8. (original) The method according to claim 2, associating an unlimited time duration with a virtual channel creating a permanent virtual channel.
9. (original) The method according to claim 2, wherein a member may join a virtual channel for less than the virtual channel's full time duration.
10. (original) The method according to claim 2, further comprising:
creating a lower and upper bounds for the virtual channel based on the time duration of the virtual channel.
11. (original) A method according to claim 2, further comprising:
reassigning time duration for a virtual channel if a virtual channel is freed.
12. (original) A method according to claim 2, further comprising:
reassigning time duration for all virtual channels if a virtual channel is freed.

13. (original) The method according to claim 11, wherein a virtual channel is freed when an upper member expires.

14. (original) The method according to claim 11, wherein a virtual channel is freed when all members expires.

15. (original) The method according to claim 12, wherein in the act of reassigning further comprises the step of reconfiguring the lower and upper bounds of all virtual channels.

16. (original) The method according to claim 11, wherein only the freed virtual channel rekeys the virtual channel key to all members of the freed virtual channel.

17. (currently amended) An apparatus for distributing a single video conference to at least three member devices via a multicast data group and a multicast session, the apparatus comprising:

control logic operable to establish a plurality of virtual channels for the video conference multicast session, each virtual channel simultaneously carrying multiple streams of video conference data of the single video conference, each stream transmitted from a different member device, each virtual channel defined by an amount of time remaining until expiration, at least two of which are different, and being operable to deliver the same video conference to member devices associated with that respective virtual channel;

a receiver for receiving a request from a requestor device to join the multicast session, the request indicating a requested start time for joining the video conference and an amount of time of utilization of the multicast session;

an assignment module for selecting a virtual channel from the plurality of virtual channels for communications by the requestor by correlating the start time and the amount of time indicated with the amount of time remaining until expiration of the virtual channels at that start time;

a requestor forwarding module for forwarding a new virtual channel key for the selected virtual channel to the requestor;

a member forwarding module for forwarding the new virtual channel key to all pre-existing members of the selected virtual channel;

~~a processing module operable to combine video conference input signals from the requestor device and the other member devices to produce a video conference data signal; and~~

a transmitter for distributing the video conference data signal to the members of the multicast group via each of the virtual channels,

whereby the apparatus enables the requestor device to join the video conference multicast data group without prompting re-keying of other member devices of the video conference associated with virtual channels other than the selected virtual channel.

18. (original) The apparatus according to claim 17, further comprising:

a virtual channel module which creates each virtual channel based on a time duration.

19. (original) The apparatus according to claim 17, wherein the assignment module prevents a member from being in more than one virtual channel.

20. (original) The apparatus according to claim 17, further comprising:

a data key distributor for distributing a data key to each multicast virtual channel.

21. (original) The apparatus according to claim 17, wherein the apparatus controls the multicast virtual channels which reside within one domain.

22. (original) The apparatus according to claim 17, further comprising:

a rekeying module for rekeying a virtual channel when membership of the virtual channel changes.

23. (original) The apparatus according to claim 18, wherein the virtual channel module creates a permanent virtual channel with an unlimited duration.

24. (original) The apparatus according to claim 18, wherein the receiver may receive a request to join a virtual channel for less than the virtual channel's full time duration.

25. (original) The apparatus according to claim 18, wherein the virtual channel module creates a lower and upper bounds for the virtual channel based on the time duration of the virtual channel.

26. (original) The apparatus according to claim 18, further comprising:

a reassignment module for reassigning time duration for a virtual channel if the virtual channel is freed.

27. (original) The apparatus according to claim 18, further comprising:

a reassignment module for reassigning time duration for all virtual channels if a virtual channel is freed.

28. (original) The apparatus according to claim 27, wherein a virtual channel is freed when an upper member expires.

29. (original) The apparatus according to claim 27, wherein a virtual channel is freed when all members expire.

30. (original) The apparatus according to claim 27, wherein the reassignment module reconfigures the lower and upper bounds of all virtual channels.

31. (original) The apparatus according to claim 22, wherein the rekeying module rekeys the virtual channel key to all members of a freed virtual channel.

32. (currently amended) A computer program product for use on a computer system for facilitating distribution of a single video conference to at least three member devices via a multicast data group and a multicast session, the computer program product comprising a

computer usable medium having computer readable program code thereon, the computer readable program code including:

computer code operable to establish a plurality of virtual channels for the video conference multicast session, each virtual channel simultaneously carrying multiple streams of video conference data of the single video conference, each stream transmitted from a different member device, each virtual channel defined by an amount of time remaining until expiration, at least two of which are different, and being operable to deliver the same video conference to member devices associated with that respective virtual channel;

receiving a request from a requestor device to join the multicast session, the request indicating a requested start time for joining the video conference and an amount of time of utilization of the multicast session;

computer code for selecting a virtual channel from a the plurality of virtual channels for communications by the requestor by correlating start time and the amount of time indicated by the requestor with the amount of time remaining until expiration of the virtual channels at that start time;

computer code for forwarding a new key for the selected virtual channel to the requestor;

computer code for forwarding the new virtual channel key to all pre-existing members of the selected virtual channel;

~~computer code operable to combine video conference input signals from the requestor device and the other member devices to produce a video conference data signal; and~~

computer code for distributing the video conference data signal to the members of the multicast group via each of the virtual channels,

whereby the requestor device joins the multicast data group without prompting re-keying of other member devices of the video conference associated with virtual channels other than the selected virtual channel.

33. (original) A computer program product according to claim 32, wherein each virtual channel is associated with a time duration.

34. (original) A computer program according to claim 32, wherein no member can be in more than one virtual channel.

35. (original) A computer program product according to claim 32, further comprising:
computer code for distributing a data key to each multicast virtual channel.

36. (original) The computer program product according to claim 32, wherein all of the virtual channels reside within one domain.

37. (original) The computer program product according to claim 32, further comprising:
computer code for rekeying the virtual channel key when membership of the virtual channel changes.

38. (original) The computer program product according to claim 33, further comprising:
computer code for associating an unlimited duration with a virtual channel creating a permanent virtual channel.

39. (original) The computer program product according to claim 33, wherein a member may join a virtual channel for less than the virtual channel's full time duration.

40. (original) The computer program product according to claim 33, further comprising:
computer code for creating a lower and upper bounds for the virtual channel based on the time duration of the virtual channel.

41. (original) The computer program product according to claim 33, further comprising:
computer code for reassigning time duration for a virtual channel if a virtual channel is freed.

42. (original) The computer program product according to claim 33, further comprising:

computer code for reassigning time duration for all virtual channels if a virtual channel is freed.

43. (original) The computer program product according to claim 41, wherein a virtual channel is freed when an upper member expires.

44. (original) The computer program product according to claim 41, wherein a virtual channel is freed when all members expire.

45. (original) The computer program product according to claim 42, wherein the computer code for reassigning, further comprises:

computer code for reconfiguring the lower and upper bounds of all virtual channels.

46. (original) The computer program product according to claim 37, further comprising computer code for rekeying a virtual channel key only to the members of a freed virtual channel.

47. (currently amended) A method of creating a secure multicast session for delivering a single video conference to at least three members ~~one member~~, the method comprising:

establishing, by a network device, a plurality of virtual channels for the multicast session, each virtual channel simultaneously carrying multiple streams of video conference data of the single video conference, each stream transmitted from a different member device, each virtual channel defined by an amount of time remaining until expiration, at least two of which are different, and being operable to deliver the same video conference to member devices associated with that respective virtual channel;

associating each member with one of the plurality of multicast virtual channels by correlating an amount of time and a start time indicated by the member with an amount of time remaining until expiration of the virtual channels at that start time;

distributing virtual channel keys to the members, each member receiving one virtual channel key selected based upon their associated virtual channel;

~~combining video conference input signals to produce a video conference data signal; and~~

for at least one of the virtual channels, rekeying the virtual channel key when membership of the virtual channel changes.

48. (original) A method according to claim 47, wherein the virtual channel key is sent in a unicast session to each member.

49. (original) A method according to claim 47, wherein each virtual channel is associated with a time duration.

50. (original) A method according to claim 47, wherein no member can be in more than one virtual channel.

51. (original) A method according to claim 47, further comprising:
distributing a data key to each multicast virtual channel.

52. (original) The method according to claim 47, wherein all of the virtual channels reside within one domain.

53. (original) The method according to claim 47, wherein in the act of rekeying at least one member is present in the virtual channel after the membership changes.

54. (original) The method according to claim 48, associating an unlimited duration with a virtual channel creating a permanent virtual channel.

55. (original) The method according to claim 48, wherein a member may join a virtual channel for less than the virtual channel's full time duration.

56. (original) The method according to claim 48, further comprising
creating a lower and upper bounds for the virtual channel based on the time duration of the virtual channel.

57. (original) A method according to claim 48, further comprising:

reassigning time duration for a virtual channel if a virtual channel is freed.

58. (original) A method according to claim 48, further comprising:

reassigning time duration for all virtual channels if a virtual channel is freed.

59. (original) The method according to claim 57, wherein a virtual channel is freed when an upper member expires.

60. (original) The method according to claim 57, wherein a virtual channel is freed when all members expire.

61. (original) The method according to claim 58, wherein in the act of reassigning further comprises the step of reconfiguring the lower and upper bounds of all virtual channels.

62. (original) The method according to claim 58, wherein only the freed virtual channel rekeys the virtual channel key to all members of the freed virtual channel.

63. (previously presented) An apparatus for creating a secure multicast session for delivering a single video conference to at least three members ~~one member~~, the method comprising:

a control module for establishing a plurality of virtual channels for the multicast session, each virtual channel simultaneously carrying multiple streams of video conference data of the single video conference, each stream transmitted from a different member device, each virtual channel defined by an amount of time remaining until expiration, at least two of which are different, and being operable to deliver the same video conference to member devices associated with that respective virtual channel;

an associator module for associating each member with one of the plurality of multicast virtual channels by correlating an amount of time and a start time indicated by the member with an amount of time remaining until expiration of the virtual channels at that start time;

a distribution module for distributing virtual channel keys to the members, each member receiving one virtual channel key selected based upon their associated virtual channel;

~~a processor operable to combine video conference input signals to produce a video conference data signal; and~~

a rekeying module operable with at least one of the virtual channels for rekeying the virtual channel key when membership of the virtual channel changes.

64. (original) The apparatus according to claim 63, wherein in distribution module the virtual channel key is sent in a unicast session to each member.

65. (original) The apparatus according to claim 63, further comprising:

a virtual channel module which creates each virtual channel based on a time duration.

66. (original) The apparatus according to claim 63, wherein the assignment module prevents a member from being in more than one virtual channel.

67. (original) The apparatus according to claim 63, further comprising:

a data key distributor for distributing a data key to each multicast virtual channel.

68. (original) The apparatus according to claim 63, wherein the multicast virtual channels reside within one domain.

69. (original) The apparatus according to claim 65, wherein the virtual channel module creates a permanent virtual channel with an unlimited duration.

70. (original) The apparatus according to claim 65, wherein the receiver may receive a request to join a virtual channel for less than the virtual channel's full time duration.

71. (original) The apparatus according to claim 65, wherein the virtual channel module creates a lower and upper bounds for the virtual channel based on the time duration of the virtual channel.

72. (original) The apparatus according to claim 65, further comprising:

a reassignment module for reassigning time duration for a virtual channel if the virtual channel is freed.

73. (original) The apparatus according to claim 65, further comprising:

a reassignment module for reassigning time duration for all virtual channels if a virtual channel is freed.

74. (original) The apparatus according to claim 72, wherein a virtual channel is freed when an upper member expires.

75. (original) The apparatus according to claim 72, wherein a virtual channel is freed when all members expire.

76. (original) The apparatus according to claim 73, wherein the reassignment module reconfigures the lower and upper bounds of all virtual channels.

77. (original) The apparatus according to claim 63, wherein the rekeying module rekeys the virtual channel key to all members of a freed virtual channel.

78. (currently amended) A computer program product for use on a computer system for creating a secure multicast session for delivering a single video conference to at least three members ~~one member~~, the computer program product comprising a computer usable medium having computer readable program code thereon, the computer readable program code including:

computer code for establishing a plurality of virtual channels for the multicast session, each virtual channel simultaneously carrying multiple streams of video conference data of the single video conference, each stream transmitted from a different member device, each virtual channel defined by an amount of time remaining until expiration, at least two of which are

different, and being operable to deliver the same video conference to member devices associated with that respective virtual channel;

computer code for associating each member with one of the plurality of multicast virtual channels by correlating an amount of time and a start time indicated by the member with an amount of time remaining until expiration of the virtual channels at that start time;

computer code for distributing virtual channel keys to the members, each member receiving one virtual channel key selected based upon their associated virtual channel;

~~computer code operable to combine video conference input signals to produce a video conference data signal; and~~

computer code operable for at least one of the virtual channels for rekeying the virtual channel key when membership of the virtual channel changes.

79. (original) The apparatus according to claim 78, wherein in distribution module the virtual channel key is sent in a unicast session to each member.

80. (original) A computer program product according to claim 78, wherein each virtual channel is associated with a time duration.

81. (original) A computer program product according to claim 78, wherein no member can be in more than one virtual channel.

82. (original) A computer program product according to claim 78, further comprising:

computer code for distributing a data key to each multicast virtual channel.

83. (original) The computer program product according to claim 78, wherein all of the virtual channels reside within one domain.

84. (original) The computer program product according to claim 80, further comprising:

computer code for associating an unlimited duration with a virtual channel creating a permanent virtual channel.

85. (original) The computer program product according to claim 80, wherein a member may join a virtual channel for less than the virtual channel's full time duration.

86. (original) The computer program product according to claim 80, further comprising computer code for creating a lower and upper bounds for the virtual channel based on the time duration of the virtual channel.

87. (original) The computer program product according to claim 80, further comprising: computer code for reassigning time duration for a virtual channel if a virtual channel is freed.

88. (original) The computer program product according to claim 80, further comprising: computer code for reassigning time duration for all virtual channels if a virtual channel is freed.

89. (original) The computer program product according to claim 81, wherein a virtual channel is freed when an upper member expires.

90. (original) The computer program product according to claim 81, wherein a virtual channel is freed when all members expire.

91. (original) The computer program product according to claim 82, wherein the computer code for reassigning further comprises computer code for reconfiguring the lower and upper bounds of all virtual channels.

92. (original) The computer program product according to claim 80, further comprising computer code for rekeying a virtual channel key only to the members of the freed virtual channel.